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DIFFERENTIATION BETWEEN NORMAL AND DISORDERED CHILDREN BY A COMPUTER ANALYSIS OF EMOTIONAL AND VERBAL BEHAVIOR.

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IT HAS BEEN SUGGESTED THAT THE EMOTIONAL CHARACTERISTICS OF PEOPLE CAN BE INVESTIGATED BY STUDYING THEIR VERBAL BEHAVIOR. THIS STUDY INVESTIGATED THE USE OF EMOTIONAL WORDS, BOTH POSITIVE AND NEGATIVE, AND THE TOTAL VERBAL OUTPUT OF NORMAL AND DISORDERED CHILDREN TO DETERMINE IF SIGNIFICANT DIFFERENCES IN VERBAL EXPRESSION OCCUR. TWO GROUPS OF CHILDREN, 7 TO 12 YEARS OF AGE, WERE RECRUITED. FORTY OF THEM WERE DIAGNOSED AS NORMAL CHILDREN, AND 38 AS HAVING BEHAVIOR DISORDERS. EACH CHILD WAS SHOWN 5 STIMULUS CARDS PORTRAYING A NEUTRAL SCENE CONTAINING 1 OR 2 PEOPLE AND WAS ASKED TO DESCRIBE INTERACTION AND EMOTION. THESE IMPRESSIONS WERE RECORDED AND THEN ANALYZED TO SEE IF THEY CONTAINED ANY OF 5 POSITIVE OR 5 NEGATIVE WORDS SELECTED TO INDICATE WHETHER THE CHILD'S REACTION TO THE STIMULUS CARD WAS POSITIVE OR NEGATIVE. ALL OF THE DATA ANALYSIS WAS DONE BY COMPUTER. THE COMPUTER WAS PROGRAMMED TO ANALYZE THE RECORDINGS FOR THE USE OF THE 10 EMOTION-DETERMINATION WORDS AND WAS ALSO PROGRAMMED TO DETERMINE TOTAL WORDS USED. THE SCORE FOR EACH CHILD WAS DERIVED BY THE COMPUTER ON THE BASIS OF A PREPROGRAMMED FORMULA. THE RESULTS SHOWED THAT THE NORMAL CHILDREN USED SIGNIFICANTLY MORE POSITIVE WORDS TO DESCRIBE THE PICTURES AND ALSO USED SIGNIFICANTLY MORE TOTAL WORDS THAN THE CHILDREN WITH BEHAVIOR DISORDERS. IT IS CONCLUDED THAT THIS COMPUTER PROCEDURE FOR ANALYSIS OF THE EXISTENCE OF EMOTIONAL DISORDERS MEANINGFULLY DIFFERENTIATES BETWEEN EMOTIONALLY NORMAL AND EMOTIONALLY DISTURBED CHILDREN. THEREFORE, IT SHOULD HAVE GENERAL VALUE IN ANALYZING GROUPS OF CHILDREN THAT HAVE NOT BEEN PREVIOUSLY DIAGNOSED FOR THE EXISTENCE OF EMOTIONAL DISORDERS. (WD)

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Differentiation between Normal and Disordered Children by a Computer Analysis of Emotional and Verbal Behavior

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A. Introduction

Studies of emotion through the investigation of verbal behavior have been carried on for many years. Three decades ago Lasswell (9) studied words in the vocabularies of political figures to obtain words which had particular positive or negative symbolic meaning such as "national honor" and "communism." At about the same time Balken and Masserman (3) reported their analysis of the language of fifteen patients in order to determine certain characteristics of neuroses relative to emotion.

Two decades ago Dollard and Mowrer (4) counted words of "comfort" and "discomfort" to arrive at their Discomfort Relief Quotient (DRQ) and Raimy (12) used a similar system to classify positive and negative emotional expressions in counseling interviews.

Recently, Tomkins (15, 16) has written a two volume work about his analysis of "positive and negative affect imagery." Laffal (8) has described a complex system of analysis of all language parts that distinguishes between normal and pathological behavior.

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Also, in the last few years, investigators have used the computer not only to study language content but also to study perceptual and cognitive processes (White, 17; Feldman, 6). And, the use of the computer for differential diagnosis in a wide number of conditions has been described by Mason and Bulgren (11). Other research reports and methodological discussions having some bearing on the present study are: Dunphy, Stone, and Smith (5), Stone, Dunphy, and Bernstein (14), Stone, Bales, Namenwirth, and Ogilvie (13), Hays (7), and Ledley (10).

In the present study, an effort has been made to further develop means of differentiation between normality and disorder by the use of specific stimuli for all subjects, empirical development of a lexicon, measurements of the extent of the response, and a control group of normal subjects. The purpose of this study is to use the computer to determine whether or not a significant difference occurs between children with behavior disorder and normal children in the use of emotional words and in total verbal output.

B. Method

1. Subjects

Two groups of subjects with an age range from 7 to 12, each

group divided approximately equally according to sex, were selected for study. One group consisted of 38 children with a clinical diagnosis of behavior disorder and the second group, 40 normal children, were matched on the basis of sex and age with the clinical group.

2. Procedure

Five stimulus cards were shown to all subjects individually and the subjects were instructed to respond to the figures in each card and to describe interaction and emotion (see Figure 1). The responses were recorded verbatim and then placed on data processing cards.

Insert Fig. 1 about here

A computer program was developed in a pilot study to provide a lexicon (Table 1) consisting of a group of five "positive" words and

Insert Table 1 about here

five "negative" words. In the present study, another computer program lists positive and negative words and provides totals of them for each subject. The program also supplies the total number of words used by each subject. A formula, $T + 50d$, was derived with "T" standing for the total number of words used in response to the five cards and "d" standing for the algebraic difference between positive and negative words. The weighting factor of 50 was determined

on the basis of the smallest number of classification errors (normal or abnormal) in reference to any other weighting factor.[2] The totals from the computer are used in the formula to obtain a score for each subject.

C. Results

The distributions of the scores based on the formula T + 50d according to the two groups are shown in Figure 2. The difference

Insert Fig. 2 about here

between the distributions of the normal sample (N = 40) and the behavior disorder group (N = 38) is statistically significant ($p < .001$) as shown by the median test.

Table 2 shows the relative frequency of subjects falling in

Insert Table 2 about here

score categories. Table 3 provides information about the use of

Insert Table 3 about here

positive and negative words and verbal output. Both factors differentiate between the normal and behavior disorder subjects. No significant sex or age differences, however, were encountered on the basis of verbalization or type of emotional response.

D. Discussion

In this study it was found that the children with behavior

disorder responded to stimuli differently from normal children in that children with disorder tend to use more words associated with feelings of hostility or depression than normal children. Such findings suggest that "positive" emotional perceptions tend to be associated with normality and that "negative" emotional perceptions tend to be associated with behavior disorder. It was also found that the total verbal output or responses of children with behavior disorder tended to be less than that of the normal children.

Although negative perceptions of disordered individuals as well as inhibition in quantity of response have been clinically observed, the results of this study provide one means of objective corroboration of such clinical observations.

The study's results suggest that there is potential value in using the method to determine the possibility of the existence of psychological disturbances in large samples such as children from culturally deprived areas.

E. Summary

In this study computer programs were developed to differentiate between normal children and children with behavior disorder. Behavioral variables studied were total verbal response and positive and negative emotional words in reference to specific stimuli. Children with

behavior disorder tended to have more limited verbal response and more negative emotional words than did the normal children.

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[2]This formula has some similarity to DRQ but here the definition of negative and positive is exactly determined and directly takes into account length of response.

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Table 1

Lexicon: Positive and Negative Emotional Words Used to Investigate Responses of Subjects to Study Stimuli

Positive	Negative
friend(s)	fight
good	mad
happy	sad
playing	scold
well	sorry

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Table 2

Frequency Distributions of Groups

Based on Scores Using Formula T + 50d

Score Frequency	Behavior Disorder Subjects (N = 38)		Normal Subjects (N = 40)	
	Number of Subjects	Relative Frequency	Number of Subjects	Relative Frequency
0-99	16	.43	...	...
100-199	15	.41	12	.30
200-299	3	.08	9	.22
300-399	1	.02	8	.20
400-499	1	.02	4	.10
500-599	...	...	3	.07
600-699	1	.02	2	.05
700-799	...	...	1	.03
800-899	...	...	...	...
900-999	1	.02	...	...
1000-1099	...	...	...	...
1100-	...	...	1	.03

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Table 3

Use of Emotional Words and Length of Verbal Response

Groups	Number of Subjects				
	Using Positive Words	Using Negative Words	Using None	<150 Words	>150 Words
Normal (N = 40)	19	3	18	4	36
Behavior Disorder (N = 38)	5	15	18	23	15

Fig. 1. Drawings of the 5 stimulus cards used in the present study. The original cards are black-and-white photographs (Alexander, et al., 1964; Alexander, 1965).

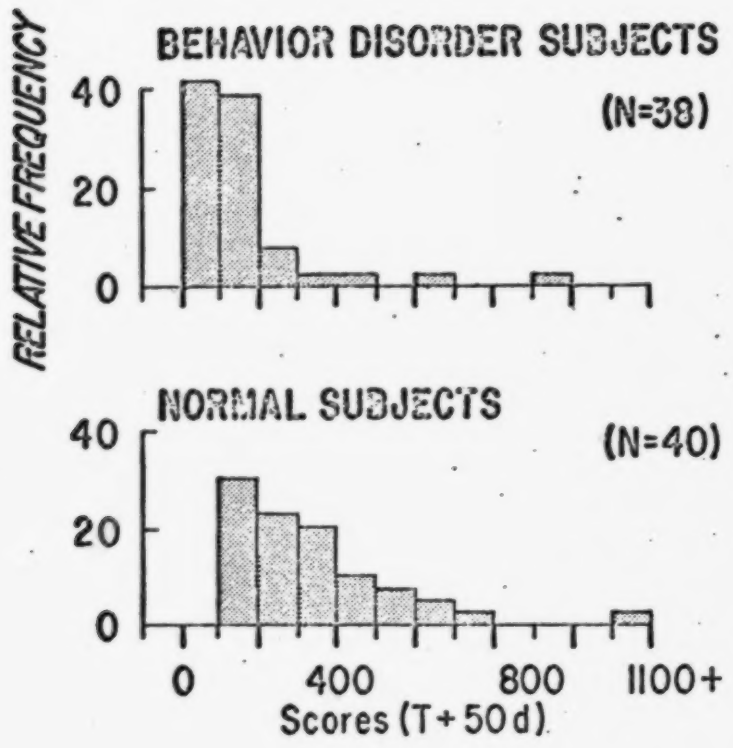

Fig. 2. Relative frequencies for groups of subjects based on scores derived from Formula T + 50d.